
शौचकुण्डों व मूत्रालयों के लिए सिरेमिक
(चीनी मिट्टी) के प्रधावन टंकियाँ — विशिष्टि
(छठा पुनरीक्षण)

**Ceramic (Vitreous China) Flushing
Cisterns for Water Closets and
Urinals — Specification**
(Sixth Revision)

ICS 91.140.70

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FOREWORD

This Indian Standard (Sixth Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Sanitary Appliances and Water Fittings Sectional Committee had been approved by the Civil Engineering Divisional Council.

This standard was first published in 1957. The first, second, third, fourth and fifth revisions were issued in 1960, 1969, 1971, 1984 and 2004, respectively.

In the fifth revision of the standard, flushing cisterns of 6/3 litres capacity were included. Other changes keeping in view the then manufacturing practices in the country were made. Through Amendment No. 2 to the fifth revision of the standard issued in January 2016, single flush cisterns of 10 litres and 6 litres capacity were deleted so as to ensure water saving by promoting use of dual flush cisterns.

In this revision of the standard, the following major modifications have been incorporated:

- a) High level cisterns, which were intended to operate at a minimum height of 1 250 mm between the top of the pan and the underside of the cistern, have been discontinued.
- b) Cast iron cisterns and enamelled pressed steel cisterns have been deleted as these have become obsolete.
- c) The standard now only covers ceramic (vitreous China) flushing cisterns. The title of the standard has been accordingly modified from 'Flushing cisterns for water closets and urinals (other than plastic cisterns) — Specification' to 'Ceramic (vitreous China) flushing cisterns for water closets and urinals — Specification'.
- d) Materials for cistern accessories such as flush pipe and coupling nut and lock-nut have been modified as per the current manufacturing practices. Those materials use of which have become obsolete, such as, lead tube/brass tube/steel tube/copper tube flush pipes have been deleted.
- e) Dual-flush cistern of capacity 10/5 litres have been withdrawn considering their huge water consumption for the intended versions and cisterns of capacity 4.8/2.8 litres and 4/2 litres have been included.
- f) Endurance test criterion for cisterns has been modified to specify 30 000 operations from existing 3 000 operations.
- g) Additional requirements for water efficiency rating and labelling of cisterns have been incorporated through reference to the concerned Indian Standard.

Plastic flushing cisterns are covered in IS 7231 : 2021 'Plastic flushing cisterns for water closets and urinals — Specification (*third revision*)'.

The composition of the Committee responsible for formulation of this standard is given in Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded *off* value should be the same as that of the specified value in this standard.

Indian Standard

CERAMIC (VITREOUS CHINA) FLUSHING CISTERNS FOR WATER CLOSETS AND URINALS — SPECIFICATION

(Sixth Revision)

1 SCOPE

1.1 This standard covers requirements for manually-operated dual-flushing ceramic (vitreous China) cisterns of capacities 6/3 litres, 4.8/2.8 litres and 4/2 litres for water closets (WC) including squatting pans and urinals, together with flush pipe details.

1.2 This standard does not cover plastic flushing cisterns and close coupled cisterns which are covered in IS 7231 and IS 2556 (Part 8), respectively are not covered in this standard.

2 REFERENCES

The standards given below contain provisions, which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreement based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

IS No.	Title
1703 : 2000	Water fittings — Copper alloy float valves (horizontal plunger type) — Specification (<i>fourth revision</i>)
2556	Vitreous China sanitary appliances — Specification
(Part 1) : 2021	General requirements (<i>fourth revision</i>)
(Part 8) : 2021	Specific requirements of closed-coupled and one-piece pedestal washdown and syphonic water closets (<i>sixth revision</i>)
4905 : 2015/ ISO 24153 : 2009	Random sampling and randomization procedures (<i>first revision</i>)
4984 : 2016	Polyethylene pipes for potable water supply — Specification (<i>fifth revision</i>)

IS No.

Title

4985 : 2021	Unplasticized PVC pipes for potable water supplies — Specification (<i>fourth revision</i>)
7231 : 2021	Plastic flushing cisterns for water closets and urinals — Specification (<i>third revision</i>)
9762 : 1994	Specification for polyethylene floats (spherical) for float valves (<i>first revision</i>)
12234 : 2021	Plastic equilibrium float valves for cold water services — Specification (<i>first revision</i>)
13049 : 1991	Diaphragm type (plastic body) float operated valves for cold water services — Specification
17585 : 2021	Beta (outflow) valves for gravity type flushing cisterns — Specification

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Cistern — A flushing device intended to operate at a height not exceeding 300 mm between the top of the pan and the underside of the cistern.

NOTE — In case of Orissa pan/squatting pan, minimum distance between top of the pan and the underside of the cistern shall be 700 mm.

3.2 Close Coupled Cistern — A flushing device intended to operate, placed on the flat surface provided at the back portion of washdown water closets.

3.3 Dual-Flush Cistern — A construction that enables the user to cause a reduced flush of partial discharge when only urine needs to be flushed away instead of the customary full flush.

NOTE — A typical illustration showing parts of a dual flush cistern is given in Fig. 1.

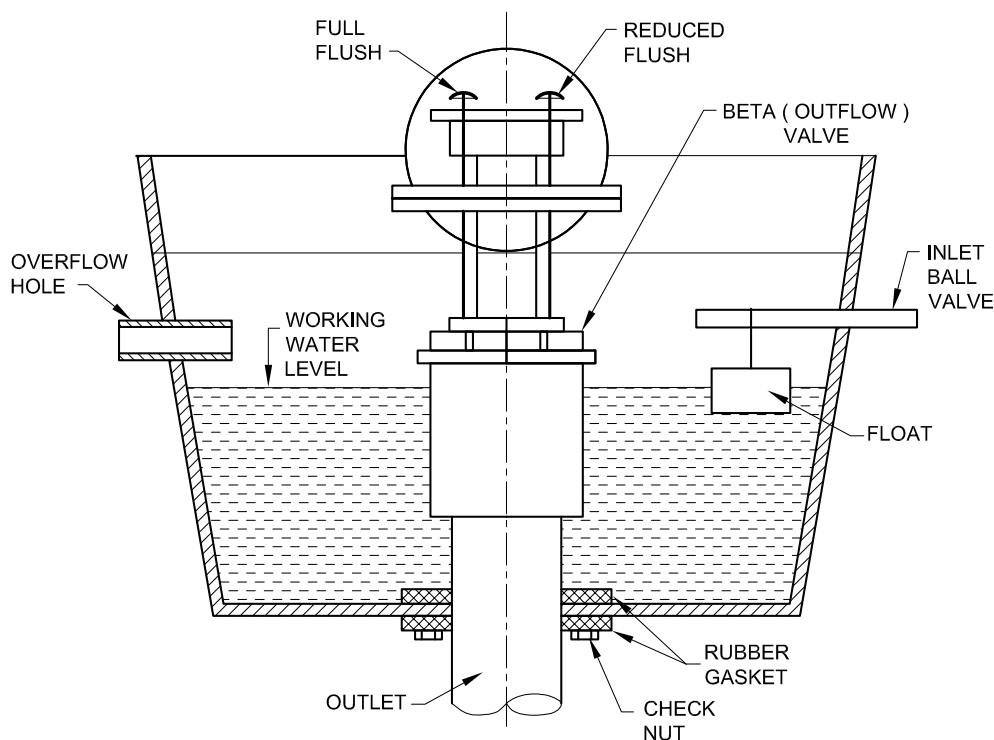


FIG. 1 TYPICAL ILLUSTRATION OF DUAL-FLUSH CISTERN

4 MATERIALS

The materials for manufacturing various components of the flushing cisterns shall conform to the requirements given in Table 1.

NOTE — Where the requirements for the materials of any component or the relevant Indian Standard designation for any materials are not specified, these shall be as agreed to between the manufacturer and the purchaser.

5 CONSTRUCTION

5.1 Cistern

The thickness of the body including cover shall be not less than 6 mm. The cistern shall be free from manufacturing faults and other defects affecting its utility. All working parts shall be designed so as to operate smoothly and efficiently. The cistern shall be mosquito-proof; it shall be deemed to be mosquito-proof only when there is no clearance anywhere in it which would permit a 1.6 mm diameter wire to pass through. The outlet of each siphon or stand pipe shall be securely connected to the cistern by means of a lock-nut. In the case of plastic siphon, it shall be provided with suitable means of ensuring and maintaining water-tight and air-tight joint to the cistern.

5.2 Cover

The cistern shall be provided with a removable cover, which shall fit closely and shall be secured against displacement. In designs, where the operating mechanism is attached to the cover, the cover may be made in two sections, the section supporting the mechanism being securely bolted or screwed to the body.

5.3 Flush Pipe

The outside diameter of the pipes shall be 38 ± 1 mm (see Fig. 2).

5.3.1 Flush Pipe Connection to Cistern

The flush pipe shall be securely connected to the cistern outlet and made air-tight by means of a coupling nut. The nominal internal diameter of the cistern outlet shall be not less than 38 mm. The upper end of the flush pipe shall be provided with suitable means for ensuring and maintaining a water-tight and air-tight joint to the flushing cistern and the flush pipe shall be detachable from the flushing cistern. There shall be no leakage from the joint under a full load of 6 litres. The above test shall be conducted 10 times by removing and refixing the nut. The centre of the outlet hole shall

Table 1 Materials for Various Components of Flushing Cisterns

(Clause 4)

SI No. (1)	Components (2)	Material (3)	Requirement/Conforming to (4)
i)	Cistern	Vitreous china	IS 2556 (Part 1)
ii)	Flush pipe	Polyethylene pipe or Unplasticized polyvinyl chloride (PVC) pipe or Polypropylene pipe	IS 4984 IS 4985 —
iii)	Cover	Same material as that of the cistern body	
iv)	Overflow pipe	Polyethylene pipe Unplasticized polyvinyl chloride pipe Any other corrosion-resistant material	IS 4984 IS 4985 —
v)	Beta (outflow) valve	—	IS 17585
vi)	Operating mechanism	Non-ferrous metal or any other corrosion- resistant material	—
vii)	Float valve	—	IS 1703/IS 12234/IS 13049
viii)	Polyethylene float for float valve	—	IS 9762
ix)	Coupling nut and lock-nut	Injection moulded high density polyethylene (HDPE)/Polyacetal/Polypropylene ¹⁾	—

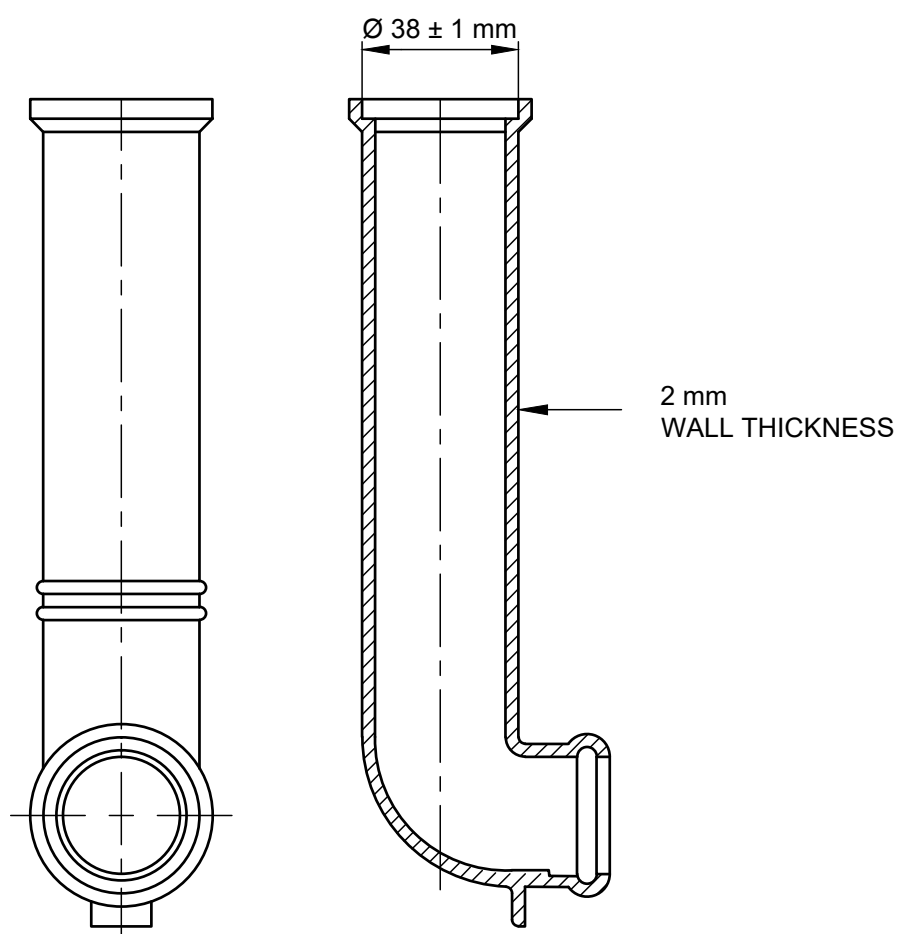
¹⁾Talc as filler, if used shall not exceed 20 percent.

FIG. 2 FLUSH PIPE

be generally central to the length of the cistern. The visible length of the outflow valve, when fitted shall be 37 ± 2 mm (see Fig. 3).

NOTE — The length of the outflow valve shall be the dimension from the bottom surface of the cistern to the end of the outlet after the cistern has been duly fitted with all washers, lock nuts, etc.

5.4 Inlet and Overflow Holes

The cistern shall be provided with inlet and overflow holes, situated one at each end, which shall be capable of accommodating an overflow pipe of not less than 20 mm nominal bore and a 15 mm size float valve (see 5.5). The holes shall be cleanly cast or drilled and the adjacent surfaces shall be smooth.

5.5 Float Valve

The float valve shall be of 15 mm nominal size and shall conform to to IS 1703 or IS 12234 or IS 13049.

5.6 Operating Mechanism

Each cistern shall incorporate a dual control method of operation that is, one initiating a full flush and other initiating a reduced flush. Discharge capacities shall be as follows:

<i>Sl No.</i>	<i>Cistern Discharge Capacity</i>	<i>Full Flush</i>	<i>Reduced Flush</i>
(1)	(2)	(3)	(4)
i)	6/3 litres	6 ± 0.5 litres	3 ± 0.5 litres
ii)	4.8/2.8 litres	4.8 ± 0.5 litres	2.8 ± 0.5 litres
iii)	4/2 litres	4 ± 0.5 litres	2 ± 0.5 litres

Particular attention shall be given to the ease of operation/functioning of the operating mechanism. The common operating mechanism is a push-knob system (see Note). The push-knob type operating mechanism shall be at the top of the cistern cover. Typical push knob design is given in Fig. 4.

NOTE — Dual control may be operated by two buttons or two handles/knobs or two concentric but separate knobs/handles or any other device in which one knob/handle actuates the full flush and the other knob/handle actuates the reduced flush.

5.7 Overflow Pipe

The overflow pipe shall be of not less than 20 mm nominal bore and shall incorporate a non-corrodible mosquito-proof device secured in a manner which will permit it to be readily cleaned or renewed when

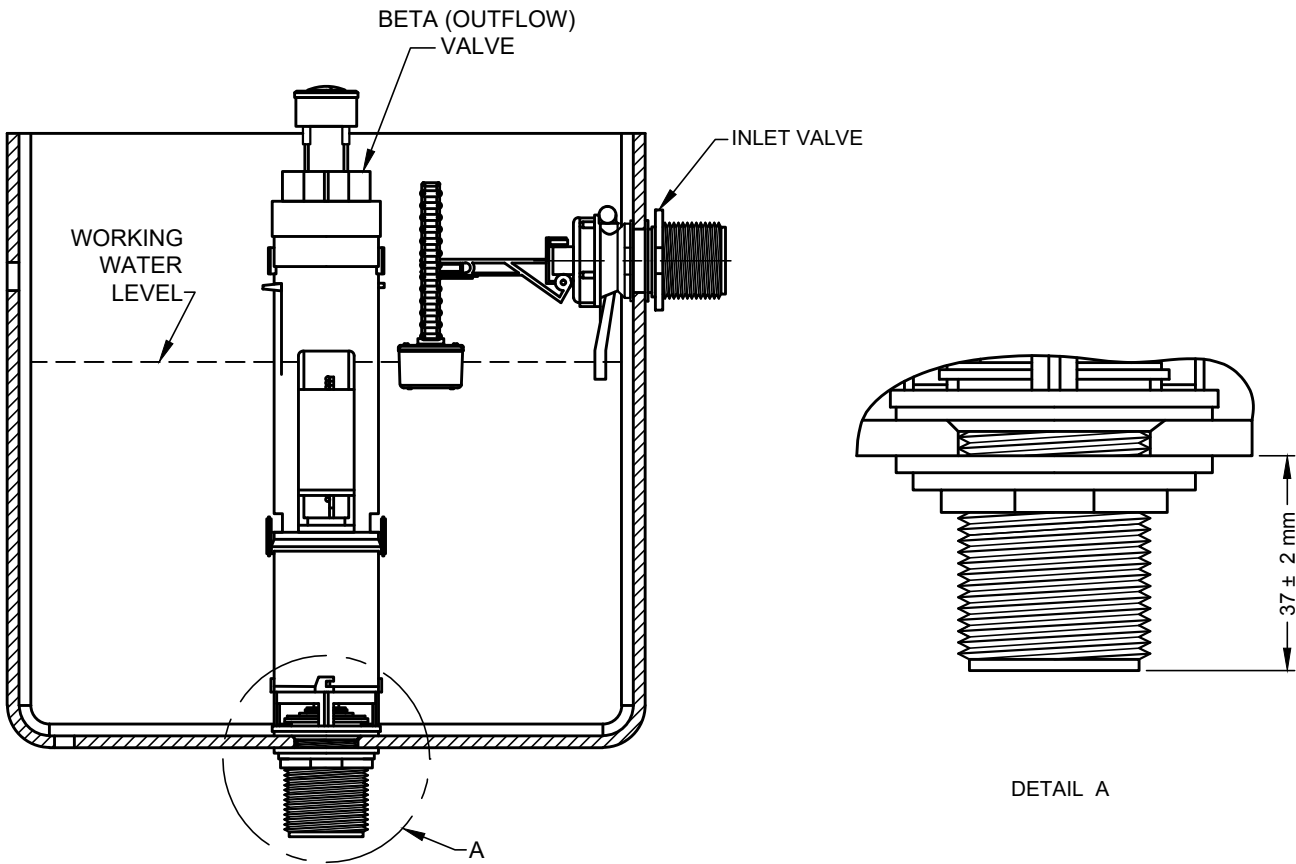


FIG. 3 VISIBLE LENGTH OF BETA (OUTFLOW) VALVE

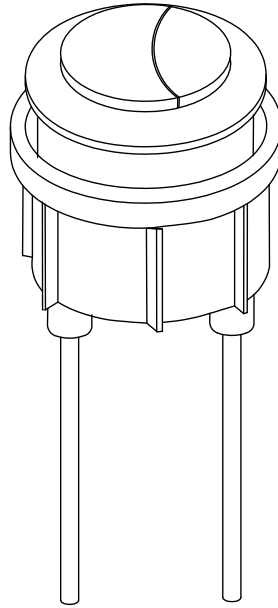


FIG. 4 DUAL FLUSH PUSH KNOB

necessary. No provision shall be made whereby the overflow from the cistern discharges directly into the water closet or soil pipe without being detected.

The invert of the overflow pipe shall be 19 mm minimum above the working water level. In case of overflow due to any reason, water should drain-out through the overflow pipe and not through the beta (outflow) valve.

6 FINISH

6.1 The surface of the cistern including cover shall be smooth and free from blisters and reasonably free from flow lines, streaking or colour variations. It shall comply to the requirements given in IS 2556 (Part 1).

6.2 The surface of the cistern shall be free from all types of joint and any hole which may cause leakage.

7 OPERATIONAL AND PERFORMANCE REQUIREMENTS

7.1 Flushing Arrangement

The cistern under working condition and with the float valve in closed position shall operate on a single operation of the operating mechanism. The valve used for flushing purposes shall be completely leak-proof.

7.2 Working Water Level

The working water level shall be a minimum of 6.5 cm below the effective top edge of the cistern and shall be legibly and permanently marked on the inside of the cistern.

7.3 Freedom from Leakage

The flushing system shall be capable of being rapidly brought into action when the water is at the working water level, but shall not leak into the flush pipe when the water is up to 10 mm above the invert of the overflow pipe.

7.4 Reduced Water Level

The discharge shall operate satisfactorily when the cistern is filled to a level up to 10 mm below the working water level.

7.5 Discharge Capacity

When tested in accordance with the procedure described in 9.1, dual-flush cisterns of,

- a) 6/3 litres capacity shall discharge 6 ± 0.5 litres and a reduced flush of 3 ± 0.5 litres, respectively;
- b) 4.8/2.8 litres capacity shall discharge 4.8 ± 0.5 litres and a reduced flush of 2.8 ± 0.5 litres, respectively; and
- c) 4/2 litres capacity shall discharge 4 ± 0.5 litres and a reduced flush of 2 ± 0.5 litres, respectively.

7.6 Discharge Rate

When tested in accordance with the procedure described in 8.2, the discharge rate for flushing cistern of:

- a) 6/3 litres capacity shall be 6 ± 0.5 litres within 4.0 s and 3 ± 0.5 litres within 2.0 s for full and reduced flush, respectively;
- b) 4.8/2.8 litres capacity shall be 4.8 ± 0.5 litres within 3.2 s and 2.8 ± 0.5 litres within 1.9 s for full and reduced flush, respectively; and
- c) 4/2 litres capacity shall be 4 ± 0.5 litres within 2.7 s and 2 ± 0.5 litres within 1.4 s for full and reduced flush, respectively.

The cistern shall be so designed that there is no appreciable variation in the force of the flush during the discharge of the required quantity of water.

8 TESTING

Cisterns shall be tested in accordance with the test procedures given in 8.1, 8.2 and 8.3. The tests in 8.1 and 8.2 may be combined in one operation, if desired.

8.1 Test of Discharge Capacity

With the water supply shut off or the cistern disconnected, and with the float valve fitted, fill the cistern with water up to the marked water line. Operate the flush mechanism and on completion of the flush, measure the quantity of water that has to be added to refill the cistern to the level of the marked water line. Alternatively, any suitable device may be used for measuring the quantity of water discharged from the cistern. The cistern should have a flush pipe fitted but need not be connected to a pan for this test.

8.2 Test for Discharge Rate

Connect the cistern to an appropriate flush pipe (*see 8.2.1*). Fill the cistern to the water line as for the capacity test and place a vessel under the open end of the flush pipe. Operate the flush mechanism and as water appears at the open end of the flush pipe start a stop watch. At the end of 4.0 s for full flush and 2.0 s for reduced flush in case of a dual-flush cistern of 6/3 litre capacity; 3.2 s for full flush and 1.9 s for reduced flush in case of a dual flush cistern of 4.8/2.8 litre capacity; and 2.7 s for full flush and 1.4 s for reduced flush in case of a dual flush cistern of 4/2 litre capacity, rapidly draw the vessel clear or otherwise divert the flow of water. Ascertain either by measuring or weighing the volume of water collected in the vessel.

For measuring the discharge rate, repeat the same operation for full flush and that for reduced flush, separately for 3 times each and calculate the average discharge rate of full flush and reduced flush of the cistern.

8.2.1 For the purpose of test, the following shall be deemed to be the appropriate flush pipe:

A vertical polyvinyl chloride (PVC) pipe, 300 mm long in case of water closet, having a nominal internal diameter of 38 mm and outer diameter of 40 mm. In case of squatting pan, the flush pipe shall be minimum 700 mm and rest will be the same.

8.3 Endurance Test

A sample of flushing cistern picked at random from production shall be first checked for conformity to the requirements for materials and construction and operational and performance requirements (*see 7*), and if it complies with these requirements, it should be operated 30 000 times for full flush and reduced flush both separately. After this test, the cistern and its component parts shall not show any damage or defects and all the parts shall be satisfactory; necessary checks shall be made for this purpose. During the test run of 30 000 times, the valve should show no sign of leakage when the cistern is operated to its rated capacity.

NOTE — This is a type test and shall be conducted whenever there are changes in the design or materials or manufacturing process or construction. Even if no change is envisaged, this test shall be done once in a year.

9 SAMPLING AND CRITERIA FOR CONFORMITY

The sampling procedure and criteria for conformity of a lot to the requirements of this specification shall be as specified in Annex A.

10 SUPPLY CONDITIONS

Flushing cisterns shall be supplied complete with all the components as listed in Table 1 including flush pipes (*see 5.3 and 5.3.1*).

11 OPERATING INSTRUCTIONS

Every cistern shall bear the operating instructions in legible lettering in the form of a leaflet. A typical operating instruction of a dual flush cistern with push-knob operating mechanism is given in Fig. 5.

12 ADDITIONAL REQUIREMENTS FOR WATER EFFICIENCY

For water efficient rating and labelling of cisterns, the requirements given in IS 17650 (Part 1) shall be complied with.

13 MARKING

13.1 Each cistern shall be indelibly marked with the manufacturer's name or trade-mark on the body, either inside or outside as found convenient to the manufacturer. The discharge capacity (*see 7.5*) shall also be marked on the cistern indelibly. The operating instructions (*see 11*) in the form of a leaflet shall be provided with the cistern

13.2 A suitable declaration shall be put on each unit indicating to the consumer the list of components supplied.

13.3 The flushing cistern shall also be provided with an instruction specifying that a particular rated cistern capacity shall be used with compatible sanitary appliance of equivalent capacity.

13.4 BIS Certification Marking

Each cistern conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the cistern may be marked with the Standard Mark.

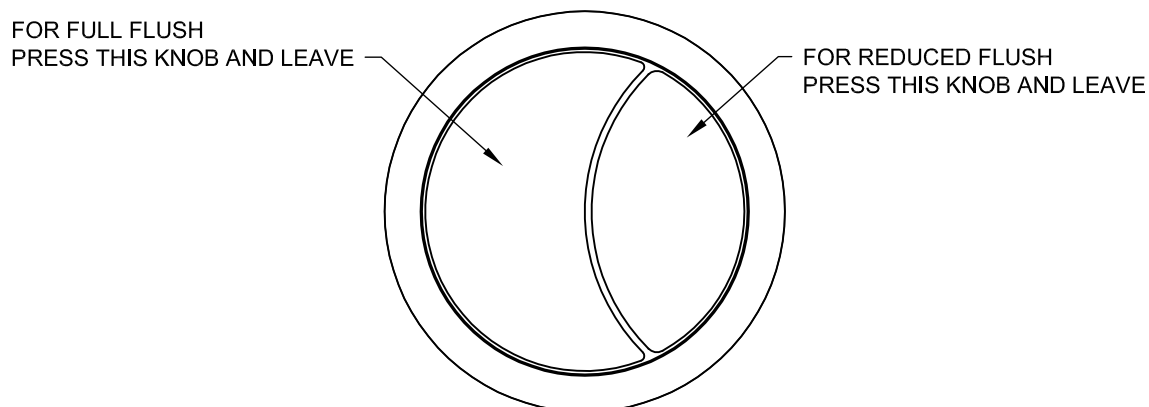


FIG. 5 TYPICAL OPERATING INSTRUCTIONS FOR DUAL FLUSH CISTERN

ANNEX A

(Clause 9)

SAMPLING AND CRITERIA FOR CONFORMITY

A-1 LOT

A-1.1 All the cisterns of the same type similar in respect of materials, design and construction and produced essentially under similar conditions of manufacture shall be grouped to constitute a lot.

A-1.1.1 Samples shall be selected and tested from each lot separately to determine conformity of the lot to the requirements of this specification.

A-2 NUMBER OF TESTS AND CRITERIA FOR CONFORMITY

A-2.1 For determining the conformity of the lot to the requirement of material, construction and finish, the number of sample cisterns to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 2 and col 3 of Table 2. The cisterns for the sample shall be selected at random from the lot. For ensuring randomness of selection, procedures given in IS 4905 may be followed.

A-2.1.1 The lot shall be considered to conform to the requirements of material, construction and finish if the number of the sample cisterns not meeting all of these requirements does not exceed the corresponding number given in col 4 of Table 2.

A-2.2 If the lot has been found conforming in **A-2.1.1**, it shall be tested for operational and performance

requirements for which number of cisterns (sub-sample) shall be taken at random according to col 5 of Table 2 from the sample cisterns found satisfactory in **A-2.1**.

A-2.2.1 The lot shall be considered to conform to the operational and performance requirements if the number of sample cisterns not meeting these requirements does not exceed the corresponding number given in col 6 of Table 2.

A-2.3 For endurance (*see* 8.3), the test shall be performed whenever there are changes in the design, materials, manufacture and construction. From the first lot after such a change takes place, 1 cistern at random shall be taken from those already found satisfactory in **A-2.1** and **A-2.2** in respect of all other requirements of this specification. If this sample cistern passes the endurance test the lot to which the sample belongs and all the subsequent lots manufactured under the same conditions of design, material, manufacture and construction shall be deemed to conform to the endurance test till any change takes place.

NOTE — This is a type test to be carried out by recognized testing laboratory and shall be conducted whenever there are changes in the design or materials or manufacturing process or construction. Even if no change is envisaged, this test shall be done once in a year.

Table 2 Scale of Sampling and Criteria for Conformity

(Clauses A-2.1, A-2.1.1, A-2.2 and A-2.2.1)

SI No.	No. of Cisterns in the Lot	For Material, Construction and Finish		For Operation and Performance Requirements	
		Sample size	Acceptance No.	Sub-sample Size	Acceptance No.
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 50	8	0	5	0
ii)	51 to 100	13	0	8	0
iii)	101 to 150	20	1	13	0
iv)	151 to 300	32	1	20	1
v)	301 to 500	50	2	32	1
vi)	501 and Above	80	3	50	2

ANNEX B*(Foreword)***COMMITTEE COMPOSITION**

Sanitary Appliances and Water Fittings Sectional Committee, CED 03

<i>Organization</i>	<i>Representative(s)</i>
Municipal Corporation of Greater Mumbai, Mumbai	HYDRAULIC ENGINEER (SHRI A. S. RATHORE) (Chairman)
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Central Public Works Department, New Delhi	SHRI M. K. MALLICK SHRI DIVAKAR AGRAWAL (<i>Alternate</i>)
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Consumer Co-ordination Council, Delhi	SHRI A. L. SAAHA SHRI S. C. SHARMA (<i>Alternate</i>)
Delhi Development Authority, New Delhi	CHIEF ENGINEER (DESIGN)
Delhi Jal Board, New Delhi	CHIEF ENGINEER (WW) II SUPERINTENDING ENGINEER (NW) (<i>Alternate</i>)
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Indian Water Works Association, New Delhi	SHRI VIJAY B. CHARHATE SHRI GURUNATH M. NAIK PARIKAR (<i>Alternate</i>)
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<i>Organization</i>	<i>Representative(s)</i>
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Research Designs and Standards Organization, Lucknow	REPRESENTATIVE
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BIS Directorate General	SHRI SANJAY PANT, SCIENTIST 'F' AND HEAD (CIVIL ENGINEERING) [REPRESENTING DIRECTOR GENERAL (<i>Ex-officio</i>)]

Member Secretary

SHRIMATI MADHURIMA MADHAV
SCIENTIST 'D' (CIVIL ENGINEERING), BIS

Sanitary Appliances and Accessories Subcommittee, CED 03 : 1

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Municipal Corporation of Greater Mumbai (Storm Water Drains), Mumbai	REPRESENTATIVE
National Test House, Kolkata	DR P. KANJILAL SHRI VIVEK SHARMA (<i>Alternate</i>)
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Water Efficient Plumbing Products, CED 03 : P1

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HSIL Ltd, Bahadurgarh	SHRI K. N. JHA SHRI AJAY JAIN (<i>Alternate</i>)
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